DISTRIBUTION, FEEDING HABITS AND BURROWING PATTERNS OF *TATERA INDICA CUVIERI* (WATERHOUSE)[1 & 2]

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(*With two text-figures*)

A survey of the distribution of *Tatera indica* revealed that *T. i. cuvieri* is present throughout Kerala. The burrow system followed no definite patterns being either short, simple or elongated and winding. Each burrow system showed a minimum of three openings and there was no evidence of grain hoarding. The nesting materials inside the burrows consisted of dry teak leaves, dry grasses, dry leaves of *Terminalia paniculata*, dry rubber leaves, dry cowpea shoots, coconut root-bits, and dry stems of *Eupatorium odoratum* depending on the vegetation around the burrow location. In Kerala, these rats cause damage to tapioca, pulses, paddy, jowar and ginger crops.

Introduction

Information on the distribution and burrow patterns of rat species is an important prerequisite for successful implementation of control programmes. Extensive surveys of the distribution of rats in Kerala have not been conducted so far. In order to obtain detailed information on the structural features of the burrow pattern of *T. indica* occurring in diverse conditions and to study their relative abundance, a survey was conducted in the State during September, 1978 to February, 1979.

Materials and methods

For the survey work, the State was divided into eight agro-climatic zones and in each zone, four representative areas were selected (Table 1).

The burrow patterns were studied by first locating the emergency escapes by random probing with a crow-bar in a specific direction along the burrow, following the location of the soil-crest. Around the emergency escape, the soil easily crumbled down and such areas were immediately sealed off by compaction. Additional emergency escapes if any were then marked out by observing whether the rats escape from the burrow system consequent on smoking. For smoking, all the burrow entrances other than the principal one, was closed initially by putting rubble and by compacting the areas around the openings. Smoke was then let into the burrow system through the main entrance by burning tightly tied sheaves of dry coconut leaflet-strips of about 40 cm length, which were inserted into the burrow entrance. The burning end was fanned continuously to ensure steady inflow of smoke stream through the other end and thus to induce asphyxiation of rats inhabiting the burrows.

The entire burrow net-work was then exposed by gently working with crow-bar and spade, and the internal structuring of burrow system and details of the brood chamber/chambers and the food chamber/chambers were studied. The depth of the different regions of the burrow systems were also recorded.

The nature of damage caused by *T. indica* was studied by examining the stand of the

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TABLE 1

DETAILS OF AGRO-CLIMATIC ZONES SELECTED FOR SURVEY WORK

S.No. of zone	Zones	Localities selected for survey work
1.	Trivandrum and Quilon districts	Vellayani, Attingal, Varkala, Adoor.
2.	Kottayam and Alleppey districts	Ettumannur, Kurianadu, Moncompu, Kidangara.
3.	Idukki and Ernakulam districts	Muthalakodam, Moolamattom, Perumbavoor, N. Parur.
4.	Trichur and Malappuram districts	Vellanikkara, Pattikkadu, Tavanur, Ponnani
5.	Palghat district	Melarkode, Nemmara, Thiruvazhiyodu, Vadakumcheri.
6.	Attappady in Palghat district	Thavalam, Chundukulam, Koolikadavu, Aanakatty.
7.	Wynaad in Calicut district	Kuppamudi, S. Battery, Meenangadi, Kalpatta.
8.	Cannanore district	Thirumeni, Cherupuzha, Aravanchal, Vellirikundu.

crop around the burrow location. The remnants of partially fed food materials recovered from the burrow were recorded as an index of the normally preferred food articles.

RESULTS AND DISCUSSION

T. i. cuvieri was found to be the only subspecies occurring in Kerala. The populations were relatively heavier throughout the State, excepting parts of Wynaad region in the Kozhikode District and parts of the Cannanore District. This is in conformity with Ellerman's (1961) report that in South India, *T. indica* populations consists mostly of *T. i. cuvieri.*

These rats were found in a wide range of habitats such as in crop fields, backyards of houses, thick grass growth, teak plantations and in waste lands. Krishnakumari (1968) recorded somewhat similar habitats for the species. However, the present observation is not in accordance with the report of Srinivasachar (1972) who stated that these rats were found only in crop fields along the bunds. The habitat variations may be attributed to the differences in the geographic features of the localities.

A total of twelve burrow systems of *T. i. cuvieri* were studied and these were of two basic types, namely, short simple and those with extensive ramifications. The structural details and other pertinent information of these two basic types of burrow systems are furnished in Table 2 and depicted in figures 1 and 2.

Pingale *et al.* (1967) reported that the burrows of *T. indica* were elongated consisting of winding passages, numerous emergency escapes and a breeding or living chamber located in the centre. In the present studies, it was found that certain burrows were quite simple in construction, while in certain other cases, the construction was quite complicated and extensive with winding passages. Another marked deviation from the previous reports is that the brood chamber/living chamber is not always centrally located.

Yashoda (1968) indicated that the live burrow systems of *T. indica* can be traced out by the presence of beaten pathways from one opening to the other and by the left over bits of leaves and slender branches across their runs. The present study clearly revealed, for the first time, that the presence of a soil plugging within the burrow close to the opening is the definite and reliable indication to the presence of live rats within the burrow.

TABLE 2

STRUCTURAL FEATURES OF BURROW SYSTEMS OF *T. i. cuvieri*

	Burrow System-1 (Simple type)	Burrow System-2 (Elongate, extensively ramifying type)
Location :	Melarkode	Aravanchal
Period of excavation	November 1978	January 1979
Nature of vegetation in the immediate vicinity	Coconut, banana and mango	denuded, rocky grassland.
Nature of soil	Laterite	Gravelly
No. of openings including emergency escapes	Three	Six
No. of emergency escapes	One	Two
Total horizontal profile dimensions	2.9 × 2 m.	4. 95 m².
Total length of the burrow system	4.94 m.	20.3 m.
Burrow width	Range 5-20 cm.	7-20 cm.
No. of brood chambers	One	One
Depth of brood chamber	34 cm.	31 cm.
Nature of nesting material	Dry leaves of *Terminalia paniculata*	Dry grasses
No. of blind alleys	One	Four
No. of soil pluggings	Two	Three
Nature of opening for removal of excavated soil.	Open	Closed and filled with soil
No. of adults and young ones captured from the burrow system	Mother and four young ones	One male, mother rat and four young ones
Basic shape of the burrow	' Y ' shaped	No definite shape

In all the burrows, a minimum of three openings including the emergency escape were observed and this is in agreement with the earlier report of Barnett and Ishwar Prakash (1975). However, Yashoda (1968) had reported two to four openings while Bindra & Prem Sagar (1975) observed that there were one to ten surface openings. The soil dug out during burrow construction was found to be thrown out only through a particular opening and this phenomenon is reported for the first time. Bindra & Prem Sagar (op. cit.) found that certain surface openings of *T. indica* burrow systems were blocked with a small quantity of soil and these were used only in emergency for escape. In the present study such blocked surface openings were not observed in any of the systems. The burrow leading to emergency escape terminates abruptly, 1-3 cm below the soil surface, leaving a thin crust of soil cover which is pushed off in emergencies.

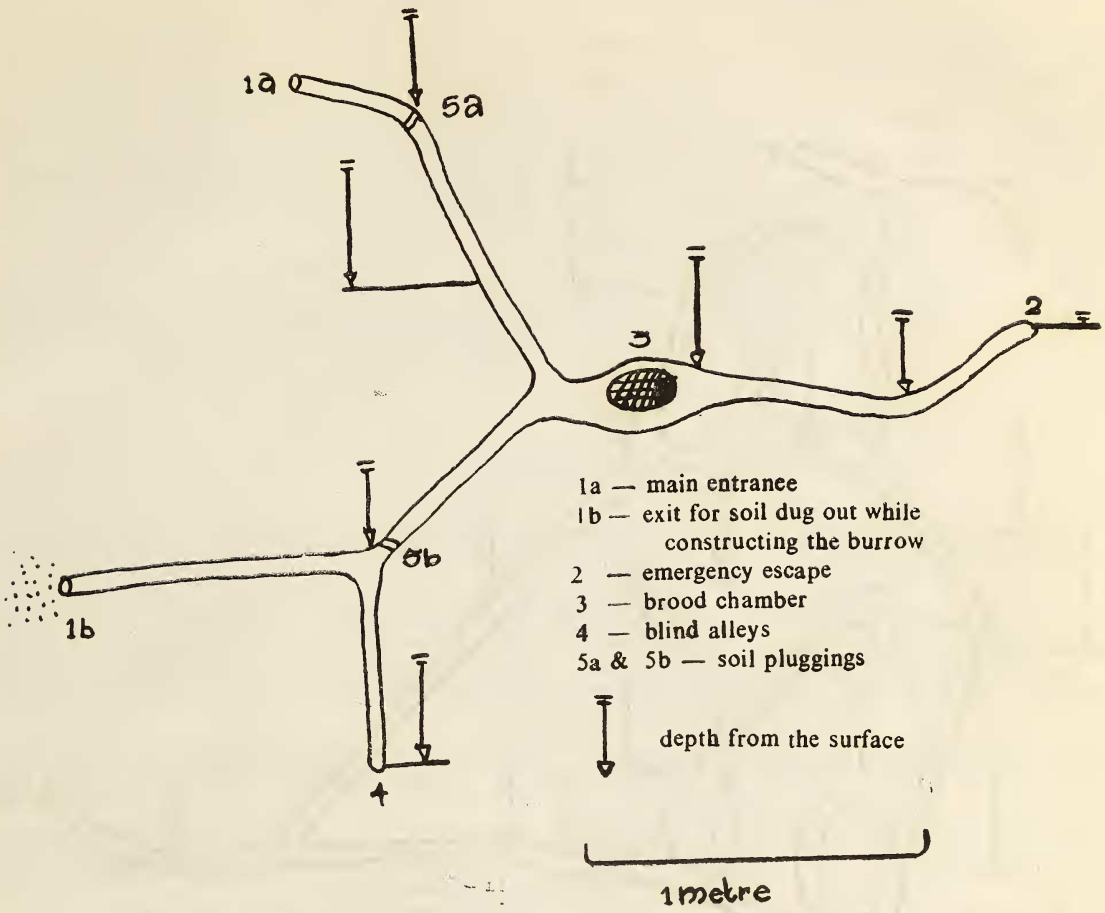

Fig. 1. Burrow system (simple type) of *Tatera indica cuvieri*.

The nesting materials used inside the burrows consisted of the following ; depending on the nature of vegetation in the vicinity of the burrow :

(1) dry teak leaves (2) dry grasses (3) dry leaves of *Terminalia paniculata* (4) dry rubber leaves (5) dry cowpea shoots (6) bits of coconut roots and (7) dry stems of *Eupatorium*.

In a few cases mixtures of these articles were found in some nests.

The nesting materials previously reported include hay and leaves (Yashoda 1968) and grasses (Srinivasachar 1972).

Only one to three adults could be collected from a single burrow system as against one to five adults reported by Sundara Bai (1972). The occurrence of relatively more number of *T. indica* (upto twelve) in the burrows is reported by Yashoda (1968) and Barnett & Ishwar Prakash (1975).

The studies on the nature of damage by *T. i. cuvieri* revealed that in Kerala, tapioca, pulses, rubber seeds, paddy, jowar and cotton were the food crops preferred by this sub-species. It was also noted that the ginger crop is subject

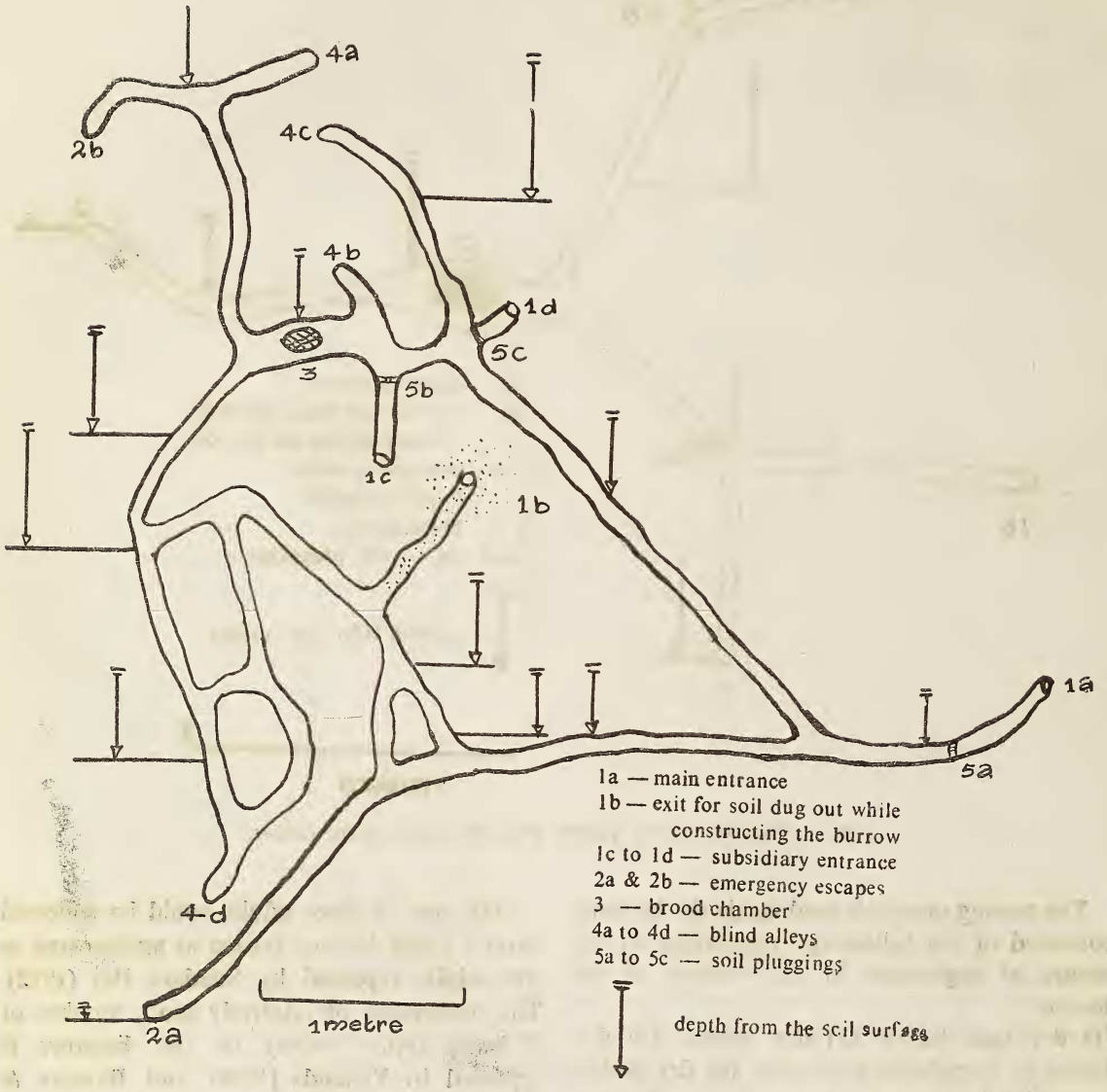

Fig. 2. Burrow system (elongate and complex type) of *Tatera indica cuvieri.*

to indirect damage due to the burrowing activity of the rats.

The earlier reports of the food crops damaged by these rats include cereal grains in general (Yashoda 1968 ; Sundara Bai 1972) and jowar and bajra in particular (Srinivasachar 1972).

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